

23rd Annual
Student
Research
Forum

April 4 & 11, 2014

Centenary

23rd Annual
**Student
Research
Forum**

April 4 & 11, 2014

Posters

Mickle Hall
(2nd floor)
2:00 P.M.
April 4, 2014

Natural Sciences

Carlile Auditorium
(Mickle Hall first floor)
2:00 – 4:20 P.M.
April 11, 2014

Social Sciences

Carlile Auditorium
(Mickle Hall first floor)
4:30– 5:20 P.M.
April 11, 2014

Humanities

Carlile Auditorium
(Mickle Hall first floor)
5:30 – 5:50 P.M.
April 11, 2014

23rd Annual Student Research Forum

SPONSORED BY

DOUGLAS F. AND MARION S. ATTAWAY FOUNDATION

JUDGES

DR. DAVID BIELER.....	<i>Associate Professor of Geology</i>
DR. DAVID BROWNHOLLAND	<i>Assistant Professor of Chemistry</i>
DR. GREG BUTCHER.....	<i>Associate Professor of Neuroscience</i>
DR. CHRIS CIOCCHETTI	<i>Associate Professor of Philosophy</i>
DR. MARK GOADRICH	<i>Broyles Chair of Computational Mathematics</i>
DR. DAVID HOAAS	<i>Professor of Economics</i>
DR. TROY MESSINA	<i>Wortham Chair of Engineering</i>
DR. REBECCA MURPHY	<i>Assistant Professor of Biology</i>
DR. DAVID OTTO	<i>Crawford Chair of Liberal Arts</i>
DR. MATT WEEKS.....	<i>James Chair of Psychology</i>
DR. MICHELLE WOLKOMIR	<i>Professor of Sociology</i>
DR. LUCY ROBINSON	<i>Associate Professor, Biochemistry & Molecular Biology</i>
DR. MICHAEL SALVATORE	<i>Professor of Pharmacology, Toxicology & Neuroscience</i>
DR. JOHNETTE MAGNER.....	<i>Executive Director at Shreveport-Bossier Business Alliance for Higher Education</i>
SARAH SMITH	<i>Attorney at Ayres, Warren, Shelton & Williams</i>
DR. JEFFERY EVANS	<i>ULM Associate Professor</i>
LINDSAY ATKINS.....	<i>Philanthropist and Volunteer</i>

DIRECTOR

DR. SCOTT CHIRHART

23rd Annual Student Research Forum

POSTER Presentations/Judging

* Presentation and judging will take place on Friday, April 4th between 2:00 p.m.-6:00 p.m. on the second floor of Mickle Hall. In preparation of the judging, presenters should have their posters in place and ready at their assigned locations no later than Thursday evening.

2:00 P.M.	Provost Karen Soul	Introduction/Welcome
2:15 P.M.	Nicholas Carroll	Psychology
2:30 P.M.	Taylor Atkinson	Psychology
2:45 P.M.	Ryan O'Donnell	Mathematics
3:00 P.M.	Lesya Ekshyyan	Biology
3:15 P.M.	Tierra Range	Biology
3:30 P.M.	Samuel Hall	Biology

Break: 3:45 P.M. — 4:00 P.M.

4:00 P.M.	Delilah Montero, Zachary Stielper, & Ashley Wilson	Biology
4:15 P.M.	Raquel Candal, Sarah Irons, and Alexandra Ross.....	Biology
4:30 P.M.	M. Payton Weidner.....	Biology
4:45 P.M.	Eli Capello and Lauren Moore	Biology
5:00 P.M.	Christopher DeGueurce, Jacqueline Argueta, Anuj Singh, and Ghalia F. Thaljah.....	Biology
5:15 P.M.	Alexandra Ross.....	Biology
5:30 P.M.	Julia Puac.....	Biophysics

ORAL Presentations/Judging

* Presentation and judging will take place on Friday, April 11th between 2:00 p.m.-6:00 p.m. in Carlile Auditorium which is located in Mickle 114.

Natural Sciences

in Carlile Auditorium

2:00 P.M.	Provost Karen Soul.....	Introduction/Welcome
2:10 P.M.	Luke White	Biophysics
2:20 P.M.	Lea Hair.....	Chemistry
2:30 P.M.	Rebecca Thompson.....	Chemistry
2:40 P.M.	Faith Clingen	Chemistry
2:50 P.M.	Blake Bourgoyne and Michael Free.....	Chemistry
3:00 P.M.	Michael Free and Blake Bourgoyne.....	Chemistry

SCHEDULE

Break: 3:10 P.M. – 3:20 P.M.

3:20 P.M.	Ericka A. Vazquez.....	Biology
3:30 P.M.	Paige Pritchett.....	Biophysics
3:40 P.M.	Kunaal Patel	Biology
3:50 P.M.	Ghalia Thaljeh.....	Biology
4:00 P.M.	Matthew Cravens and Lesya Ekshyya	Biology
4:10 P.M.	Andrea Argueta Lemus.....	Biology

* Natural Sciences Oral Presentations end about 4:20 P.M.*

Break: 4:20 P.M. – 4:30 P.M.

Social Sciences

in Carlile Auditorium

4:30 P.M.	Crystal Hong.....	Economics
4:40 P.M.	Cameron Hughes	Economics
4:50 P.M.	Angela Impson	Sociology
5:00 P.M.	Matthew Scott.....	Psychology
5:10 P.M.	Freddricka Richardson	Psychology

* Social Sciences Oral Presentations end about 5:20 P.M.*

Break: 5:20 P.M. – 5:30 P.M.

Humanities

in Carlile Auditorium

5:30 P.M.	Kayla Marion.....	Religious Studies
5:40 P.M.	Tianna Murphy	Religious Studies

Humanities Oral Presentations end about 5:50 P.M.

Poster Presentations

Scales of Devotion to God and Religion

Nicholas Carroll

Research Advisor: Dr. Matthew Weeks

Department of Psychology
Centenary College of Louisiana

This experiment consists of surveys of religious and spiritual devotion and beliefs. The information collected will be used to develop new testing techniques for religiosity. Participants will be asked to complete an online survey. The survey is divided into 5 sections. Each section's questions will be presented in a random order. The first section is a Religious Orientation Scale meant to show participant levels of intrinsic and extrinsic religiosity. The second section is a scale for religious doubts. The third section is a scale for determining how close participants believe they are to God. The fourth section is a scale designed to see how mature a participant is in his or her religious beliefs. And, section 5 is the set of questions designed for this experiment meant to be used to build a new scale for devotion to God.

Strength of Handedness and Backward Recall

Taylor Atkinson

Research Advisor: Dr. Matthew Weeks

Department of Psychology
Centenary College of Louisiana

Many cognitive functions require the use of specialized areas of the brain that are generally lateralized to one side of the brain or the other. Some functions use multiple areas and rely on the corpus callosum to communicate information between hemispheres. Backward recall is one such task that requires different hemispheres for different functions. Encoding has been shown to be a left-hemisphere activity while recall involves processes in the right hemisphere. Research has shown that in such cases the size of the corpus callosum can have an influence on an individual's ability to carry out such a task. Without access to imaging, corpus callosal size can be inferred by a correlate measure: strength of handedness. In the first experiment, in order to test to see if corpus callosal size and backward recall ability were correlated, participants were given a survey to determine strength of handedness and a recall task to determine backward recall ability. Visual-spatial cognition was also measured. In the second experiment, a more valid measure of visual-spatial ability was used and a dichotic listening task was included in order to determine laterality of speech processing in participants.

Optimization of Shreveport Public Transportation Routes

Ryan O'Donnell

Research Advisor: Dr. Mark Goadrich

Department of Mathematics
Centenary College of Louisiana

Many people in cities depend on public transportation to travel through their home city in a quick, affordable fashion. Optimization of public transportation routes could lead to both cost savings and better rider satisfaction. We created a model for the SporTran public bus system in Shreveport using GeoMASON, an agent-based modeling toolkit.

Our model simulates people who use public transportation to travel to and from work. Buses travel down roads generated by Geographical Information Systems (GIS) data for the road system in Shreveport, with paths found through A* search. Our simulation allows us to analyze and visualize current bus routes, and subsequently compare multiple system layouts to determine efficient travel plans for a given population distribution.

Effects of Disease modifying drug (DMD) on Inflammation and Immunomodulation in a Viral Model of Multiple Sclerosis

Lesya Ekshyyan

Research Advisors: Dr. Seiichi Omura,² Dr. Fumitaka Sato,² Nicholas E. Martinez,² Dr. Eiichiro Kawai,² Tierra Range¹, Sadie Elliot², and Dr. Ikuo Tsunoda²

¹Centenary College of Louisiana, Shreveport, LA

²Department of Microbiology & Immunology, Louisiana State University Health Sciences Center, Shreveport, Louisiana

Multiple sclerosis (MS) is an inflammatory demyelinating disease of the central nervous system. MS is believed to be caused by interactions between autoimmunity, viral infection, and genetic factors. The disease modifying drug (DMD) is approved to treat patients with MS. Some of its activity is attributed to its ability to elevate levels of T helper (Th)2 and regulatory T cells, and reduce levels of inflammatory Th1 and Th17 cells. DMD has been tested in the autoimmune model of MS, but its efficacy in the viral model, induced by Theiler's murine encephalomyelitis virus (TMEV), is unknown. We performed two experiments in which SJL/J mice were infected with TMEV and given DMD injections during designated stages of the disease. Clinical signs were assessed daily by weighing and scoring the righting reflex. Concentrations of signature cytokines of Th1, Th2, Th17, and Treg cells were determined by enzyme-linked immunosorbent assay to characterize immunomodulatory effects. Lower doses of DMD given during the acute phase produced better clinical outcomes than high doses. Low doses of DMD increased production

of anti-inflammatory cytokines; while high doses decreased both pro-inflammatory and anti-inflammatory cytokine concentrations. Our results demonstrated that DMD can suppress some inflammatory immune responses, leading to disease suppression

Inflammatory demyelination is suppressed by a disease-modifying drug in Theiler's virus model of multiple sclerosis.

Tierra Range

Research Advisors: Drs. Omura, Kawai, Sato, Morris, Tsunoda, Nick Martinez, Viromi Fernando, Sadie Elliott, and Lesya Ekshyyan

Department of Microbiology and Immunology
Louisiana State University Health Sciences Center,
Shreveport, Louisiana

Multiple sclerosis (MS) is an inflammatory demyelinating disease in the central nervous system. Although we do not know the cause of MS, autoimmune responses against myelin and viral infections have been associated with MS pathogenesis. A disease modifying drug (DMD) has been an accepted treatment for MS for many years, and has also been studied in an autoimmune animal model of MS—experimental autoimmune encephalomyelitis (EAE)—to determine its efficacy. But determination of the efficacy of the DMD in a viral animal model of MS has yet to be completed. Theiler's murine encephalomyelitis virus (TMEV) can induce an inflammatory demyelinating disease with virus persistence in susceptible mouse strains, such as SJL/J mice. TMEV-induced demyelinating disease (TMEV-IDD) has been used as a viral model for MS. In two separate experiments 5-week-old SJL/J mice were infected with TMEV, and given DMD injections over a 7 week period. Clinical signs were assessed daily by weighing and scoring of the righting reflex Neuropathology was assessed by Luxol fast blue staining. Based on clinical and histological findings, we believe the DMD is suppressing inflammatory immune responses and reducing demyelination, therefore suppressing clinical signs and inhibiting disease progression.

Phylogenetic Implications of mtDNA Sequence Variation in Deer Mice from California

Samuel Hall

Research Advisor: Dr. Scott Chirhart

Department of Biology
Centenary College of Louisiana

Mice from the genus *Peromyscus* constitute the most successful group of native North American small mammals, and none is more widely distributed or intensively studied than the deer mouse, *P. maniculatus*. Despite how well studied *P. maniculatus* is there is still a lack of resolution in the phylogenetic tree between *P. maniculatus*, *P. Sejugus*, and *P. Keeni*. A previous study using mtDNA

sequence data from the ND3/ND4L/ND4 obtained by Hogan et al proposed that *P. keeni* and *P. sejugis* share a sister relationship and *P. maniculatus* from Baja California separate out from central and northern *maniculatus*.

The purpose of this research project was to identify the geographic boundary of the *P. sejugis*-like haplogroup and to determine the relationship of this haplogroup to C/N *P. maniculatus* and *P. kenni*. In this study, analyses of mtDNA sequence data from the ND3/ND4L/ND4 was from 38 individuals each of *P. maniculatus* from central and northern California (Fresno, Johannesburg, and Arcata) and compared to reference sequences for *P. keeni*, *P. maniculatus* from the central and northern United States, *P. sejugis*, and *P. maniculatus* from Baja and Southern California. The mtDNA was sequenced using a ABI 377 and were aligned using Sequencher 4.1.

The Impact of Rosemary Aroma on Semantic Memory

Delilah Montero, Zachary Stielper, and Ashley Wilson

Research Advisor: Dr. Greg Butcher

Department of Biology
Centenary College of Louisiana

Olfaction, the sense of smell, plays a critical role in the lives of a variety of animals, including humans. For many animal species, the ability to smell functions as a major mechanism of protection and survival, in addition to serving as a means of communication and reproduction.² In addition to its well-recorded functions, increasing amounts of data indicate that olfaction is also connected to memory.⁵ Studies investigating this connection have illuminated the ability of odors to prompt vivid autobiographical memories, which has been coined the Proust phenomenon. The research done on this ability has suggested that odors are potent cues for the retrieval of autobiographical information, which has been explained through differing hypotheses.

The focus of the study herein is to investigate the relationship between olfaction and semantic memory, the memory of factual and concept-based knowledge. The current study analyzes this relationship by comparing data from semantic memory tests given to participants tested in the presence of rosemary scent and in the lack of any odorant. Given results generated from previous studies, we hypothesize that there will be a positive influence of the rosemary scent on semantic memory.

Music Therapy and Its Effect on Quality of Life of Alzheimer's Patients

Raquel Candal, Sarah Irons, and Alexandra Ross

Research Advisor: Dr. Greg Butcher

Department of Biology
Centenary College of Louisiana

Alzheimer's is a devastating disease with symptoms ranging from memory loss to behavioral changes. These behavioral changes can be detrimental to a person's quality of life. In some cases, behavior changes have been shown to improve after participation in music therapy, though there is little agreement on the type of music that is most effective. We hypothesized that patients participating in music therapy with a customized playlist would show greater improvements in behavioral symptoms than participants with a random playlist or a no-music control. The following pilot study was designed to answer this question. Participants would be included who had a diagnosis of Alzheimer's Disease and a Mini Mental State Examination (MMSE) score of 19 or less. The participants would be randomly sorted into a customized playlist group, randomized playlist group, and a no-music control group. The effects of the therapy would be measured using a pre- and post-test MMSE and Neuropsychiatric Inventory (NPI). If the results of the pilot study were to show that a customized playlist significantly reduced agitation compared to the random playlist and the no-music control, this result could be used to develop more effective music therapy programs to help people living with Alzheimer's disease.

Epithelium of GAD65-GFP Mice: A New Model For Studying Olfactory Sensory Neuron Maturation?

Matthew P. Weidner

Research Advisors: W. Devin Owens,^{2,3} Brian McRae,^{1,3}
Kathryn A. Hamilton⁴

¹Department of Biology, Centenary College, Shreveport, LA

²School of Medicine, LSU Health Science Center, Shreveport, LA

⁴Dept. of Cellular Biology and Anatomy, LSU Health Science Center, Shreveport, LA

Olfactory sensory neurons (OSNs) are unique bipolar neurons that occur in the main olfactory epithelium (MOE) of the nasal cavities. Importantly, new OSNs can be generated even in adults, and olfactory acuity can be maintained in the face of this plasticity. Few biomarkers are available for identifying specific stages of OSN development. Here, we introduce transgenic GAD65-GFP mice as a potential model for studying these neurons. In GAD65-GFP mice, interneurons that express the 65 kDa isoform of glutamic acid decarboxylase (GAD65) instead express green fluorescent protein (GFP).

We have found that the MOE of adult GAD65-GFP mice contains bipolar GFP+ cells that resemble OSNs. The cells have an oval cell body from which extend an apical dendrite and an axon. Although the dendrite terminates in a typical

knob, it lies below the epithelial surface, suggesting that the GFP+ OSNs are neither mature nor functional. This was confirmed by immunostaining for olfactory marker protein (OMP) and key components of the olfactory transduction signaling cascade, including $G\alpha_{olf}$ and adenylyl cyclase III. GFP+ OSNs are not immunoreactive for any of these markers, whereas neighboring GFP-negative OSNs expressed all three. We postulate that the GFP+ cells are newly-generated OSNs that express GFP until they mature or, alternatively, undergo apoptosis. We are currently using immunohisto-chemical staining methods to examine these possibilities.

³Authors contributed equally. Work was supported by NIH grant DC007876.

Community Outreach in Neuroscience

Eli Capello and Lauren Moore

Research Advisor: Dr. Greg Butcher

Department of Biology
Centenary College of Louisiana

This presentation is a highlight of community outreach projects conducted by Centenary Neuroscience students, including creating interactive lessons for children and creating neuroscience art.

Affect and Perception: The Interaction of Visual and Auditory Stimuli

Christopher DeGueurce, Jacqueline Argueta, Anuj Singh,
and Ghalia F. Thaljah

Research Advisor: Dr. Greg Butcher

Department of Biology
Centenary College of Louisiana

Film and music have a widely recognized ability to alter the affective state of those who consume them. We intend to elucidate the relative strength of affective manipulations caused by visual stimuli in the form of film and auditory stimuli in the form of music, as well as determining how these manipulations interact. We hypothesize that visual and auditory stimuli, when loaded with positively (joyous) and negatively (fearful) valenced affect, will produce a stronger shift in participant affective state when the valence of the affective loads are congruent and a weaker shift when incongruent or paired with a neutrally valenced stimulus. We also predict that the strength of affective manipulation may differ between stimulus types. To test this hypothesis, we will present participants with nine samples of paired auditory and visual stimuli in conditions in which the stimuli are congruently, incongruently, or neutrally paired, surveying affective state before manipulation and after each stimulus pair presentation while also collecting galvanic skin response data. Statistical analysis of this data should reveal evidence of the presence or lack thereof of the hypothesized interaction and relative primacy of stimulus strength in manipulating participant affect.

Optimization of conditions for nitric oxide production and effect of passage number on growth rate of RAW 264.7 cells

Lexi Ross

Research Advisor: Dr. Cristina Caldari

Department of Biology
Centenary College of Louisiana

Macrophages are antigen-presenting cells of the innate immune system that upon activation through their interaction with pathogens produce cytokines and reactive oxygen species that help attract and activate other immune cells. Immortalized cell lines, like the murine RAW 264.7 cell line, are useful in cell culture studies. Studies of different cell lines indicate that over time the characteristics of immortalized cell lines can change. Anecdotal evidence suggests that the RAW 264.7 cell line experiences changes in reactive oxygen species production, cell differentiation, and growth rate as passage number increases. The objective of this study was to examine growth rate in increasing passage numbers of RAW 264.7 cells, as well as to optimize conditions for nitric oxide (NO, a reactive oxygen species) production by this cell line. Macrophages were grown to 90% confluence in a 95% O₂, 5% CO₂, humidified atmosphere. All experiments began with passage 3 cells. Growth rate was determined by counting cells using a hemacytometer and Trypan blue exclusion staining. Growth rate data indicated that between days 0 and 2 growth rate increased, while decreasing between days 2 and 4, as passage number increased. Treatment of murine macrophages for 24 h with increasing doses of LPS (0, 0.01, 0.10, 1.0, 10.0, 100 µg/ml) resulted in an increase in NO levels measured in the supernatant with a peak at 0.01 µg/ml of LPS. Treatment of murine macrophages with 0.01 µg/ml of LPS for increasing incubation times (0, 0.5, 1, 3, 6 h) resulted in an increase in NO production by these cells with a peak at 0.5 h. Further experiments using these optimal conditions will be performed to determine whether or not NO production changes as passage number increases. Elucidating changes in the RAW 264.7 cell line due to increasing passage numbers can help researchers control for such changes in the results from experiments performed with this cell line.

Construction of a Prototype Biodigester for Demonstrating Potential Sustainable Improvements to the College

Julia Puac

Research Advisor: Dr. Troy Messina

Department of Biophysics
Centenary College of Louisiana

Reduce, reuse, and recycle is the mantra of sustainably-minded groups and organizations. There are many opportunities to implement sustainable practices at homes and businesses with very little monetary input. In some cases, there

may even be government incentives to do so.* Here we detail the construction of a prototype biodigester that will convert human waste into methane gas and a concentrated biproduct solution that can be used as fertilizer. Our intention is to demonstrate the simplicity of such a system, and to encourage Centenary College to consider installing a campus-wide biodigester.

The installation could potentially be assisted through some government incentives that we will highlight.

*<http://www.dsireusa.org/>

Natural Science Oral Presentations

Controlling the “Stickiness” and Electronic Properties of Graphene by Doping

Luke White

Research Advisors: Dr. Boris Yakobson and Alex Kutana

Department of Materials Science and NanoEngineering
Rice University

Graphene is known to have extraordinary mechanical and electronic properties. However, to utilize these properties it is often necessary to thoughtfully modify the graphene, such as doping it with specific elements. In the spirit of the Materials Genome Initiative (MGI) approach, the effect of recently discovered silicon substitutional doping on the mechanical and electronic properties of graphene was considered by performing Density Functional Theory (DFT) calculations. Increasing the stickiness, or adhesion strength, is crucial for the interface load transfer and general increase of the mechanical strength in composite materials. We show that for Si-doped graphene on pristine graphene and hexagonal boron nitride substrates, the corresponding Si-C and Si-B,N interaction can bind nearly ten times stronger than the corresponding C-C and C-B,N interaction. It would also be desirable for graphene to exhibit semiconducting properties. Previously, it has been shown that a band gap opens up in graphene in the presence of a boron nitride substrate, thereby making graphene a semiconductor. It was calculated that Si-doped graphene nearly doubles in size when in the presence of the boron nitride substrate. Thus, doping graphene with silicon has the potential to enhance both mechanical and electronic properties of this material.

Comparison of Several Mass Spectrometry Techniques for Dye Analysis

Lea Hair

Research Advisor: Dr. Mehdi Moini

Department of Forensic Sciences
George Washington University

Various analytical techniques have commonly been used in the identification of the organic compounds used to color historic textiles. Mass spectrometry (MS) is the most common of these methods of dye analysis. Commonly used MS techniques include: Direct analysis in real time (DART-MS), matrix-assisted laser desorption/ionization (MALDI-MS), laser desorption/ionization (LDI-MS), and high performance liquid chromatography (HPLC-MS). For this project, all of these methods were tested and compared for their capacity to analyze dyes. In addition, three methods of sample introduction were tested: 1) Direct sample introduction. In this technique a piece of fabric was directly analyzed without any sample preparation. 2) Minimal sample preparation. In this technique the samples were prepared using a liquid additive to help extract and ionize the dye compounds. 3) Dye extraction techniques. Three different solvents were used to extract the dye compound from the fabric itself. These three solvents were Oxalic acid, Trifluoroacetic acid (TFA), or Ethylenediaminetetraacetic acid (EDTA). To compare these dye analysis methods, five historic silk samples dyed by Indigotin, Ellagic acid, Rutin, or Guinea Green B were used as test specimens. In addition, another sample dyed by an unknown Flavonoid, a class of dye compounds, was tested as our unknown. Indigotin has been successfully detected by several techniques.

Drug Absorption into BlueSeal Liquid to Prevent Contamination of Water Systems

Rebecca Thompson

Research Advisor: Drs. Joshua Lawrence and David Brownholland

Department of Chemistry
Centenary College of Louisiana

The absorption of the drug Prozac into an oil-based liquid present in the waterless urinals at the university was optimized. The research was based off of the fact that anti-depressants and other drugs are being prescribed more often in modern medicine. Studies show these drugs are being excreted from the human body in large enough abundances to harm animals that come in contact with the sewage systems. The oil-based layer, known as BlueSeal liquid, served to absorb these drugs so, eventually, ecosystems would be exposed to fewer amounts of the harmful chemicals. Multiple extractions, using different buffer systems set within a pH range of 6 to 9, were analyzed for the absorption of Prozac into the BlueSeal liquid. Fluorine Nuclear Magnetic Resonance (^{19}F NMR) was used to monitor the amount the drug by measuring the abundance of the trifluoromethyl group present. Due to problems of consistency in the analysis of data only trends in data were established.

Perfluoroorganometallic B12 Mimics: Synthesis and Attempted Perfluoroalkyl Transfer

Faith Clingen

Research Advisor: Dr. David Brownholland

Department of Chemistry
Centenary College of Louisiana

Many pharmaceuticals require a trifluoromethyl functional group to be present on an arene. Prozac synthesis, for example, requires this trifluoromethyl arene to be present at the beginning of synthesis, which leaves little room for versatility or change. This trifluoromethyl arene is very difficult to synthesize and requires harsh conditions. B12 is known to do a methyl transfer in vivo. By creating a trifluoromethyl B12 mimic we may be able to create conditions in which the trifluoromethyl can transfer to an arene making synthesis of many pharmaceuticals more versatile and economical.

The Synthesis of a Tetraether Glycerophospholipid with Two Different Headgroups

Blake Bourgoyne and Michael Free

Research Advisor: Dr. David Brownholland

Department of Chemistry
Centenary College of Louisiana

In attempting to address the morphological instability of membrane-based biosensors, we propose the use of tetraether lipids (or bolalipids) instead of the conventional monopolar phospholipids. Tetraether lipids are lipids naturally found in Archaea and form significantly more stable membranes, but the structure-function relationships of these materials are poorly understood in regards to the symmetry, or lack thereof, of the bipolar lipid. To address this deficiency, we are interested in synthesizing asymmetric bolalipids containing either different polar headgroups and/or different alkyl chains on the 2 and 2' positions. The progress towards the synthesis of an asymmetric bolalipid with a single 24 carbon transmembrane spanning chain and two different headgroups: a phosphatidylcholine and a phosphatidylethanolamine will be reported. The benefits of our synthetic pathway towards the aim of synthesizing a library of asymmetric bolalipids will also be discussed.

The Synthesis of a Tetraether Glycerophospholipid with Two Different Headgroups

Michael Free and Blake Bourgoyne

Research Advisor: Dr. David Brownholland

Department of Chemistry
Centenary College of Louisiana

Tetraether lipids are naturally found in Archaea and form significantly more stable membranes than those formed from conventional monopolar phospholipids. These materials can help address the morphological instability of membrane-based biosensors. Unfortunately, the structure-function relationships of these materials are poorly understood, particularly in regards to the symmetry, or lack thereof, of the bipolar lipid. Thus, we are interested in synthesizing asymmetric bolalipids containing either differing headgroups on each terminus and/or differing alkyl chains on the 2 and 2' positions of opposing glycerol subunits. An asymmetric bolalipid precursor was synthesized in eight steps in 24% overall yield. A precursor to an alternative for the transmembrane spanning chain was synthesized in two steps in 17% overall yield. Future direction includes adding phosphatidylcholine and phosphoethanolamine polar head groups selectively. Once the final asymmetric bolalipid has been synthesized, morphological properties will be investigated.

Influence of Cited2 protein on tnnt3b regulation, muscle differentiation, and muscular dystrophy development

Ericka A. Vazquez

Research Advisors: M. Birgün Özçolak, G. Sheela Devakanmalai and Ertugrul M. Özbudak

Department of Genetics
Albert Einstein College of Medicine, Jack and Pearl Resnick Campus

Muscular dystrophy (MD) diseases encompass a range of genetic diseases that cause the degeneration of muscle tissue and the weakening of muscles. MD is known to weaken body systems and reduce life expectancy. The degenerative capacity of different types of muscular dystrophy diseases, such as Duchenne MD and Becker MD, lead many to investigate the restorative possibilities for those affected by these medical conditions. Cited-family proteins have been identified as a necessary and important component for the normal maintenance of muscle tissue. Cited2 protein (cAMP-response element-binding protein (CBP)/p300-interacting transactivator with glutamic acid (E)-aspartic acid (D)-rich tail 2) is a transcription cofactor expressed in fast muscle precursors, and its absence leads to muscle dystrophy. In this project, we found associations between *cited2* gene and other muscle genes that are vital in *Danio rerio*. Through observation and investigation of zebrafish muscle development, these associations could potentially unveil new paths for MD treatment. We

found 1) Cited2 protein to be an interacting partner with tnnt3b, 2) a myofiber differentiation delay in the absence of Cited2, and 3) muscular atrophy in the absence of Cited2. Future work involves carrying out mechanistic studies of interacting partners involved in development.

Cation Exchange Nanomaterials for Solution Purification

Paige Pritchett

Research Advisors: Dr. Boyle,¹ Dr. Bell,¹ Michael L. Neville,¹
and Dr. Clyburne²

¹Sandia National Laboratories, Advanced Materials Laboratory,
Albuquerque, NM

²Chemistry Department, Saint Mary's University, Halifax, Nova Scotia

Fluid contamination by metal cations, (i.e., Hg^{2+} and $^{90}\text{Sr}^{2+}$) commonly occurs through natural rock weathering processes, natural gas burning, and nuclear incidents. Heavy metal fluid contamination is known to instigate harmful effects in living creatures. In particular, we have focused on the removal of harmful cations from fluids to yield clean drinking water in contaminated areas. The approach to solve this problem that we have propounded is to embed reactive nanoparticles in polymer films and/or mats. Removal of Hg^{2+} and Sr^{2+} was investigated through the use of Ag^0 and CaWO_4 nanoparticles, respectively. The nanoparticles were synthesized following solvothermal or solution precipitation routes and characterized by powder X-ray diffraction (PXRD), FTIR spectroscopy, and transmission electron microscopy (TEM). The Ag^0 and CaWO_4 nanoparticles were each dispersed in various polymer solutions; electrospinning, forcespinning, and spin coating were used to produce films and mats of these nanoparticle-containing solutions. The activity of the samples was evaluated in water solutions containing known amounts of Hg^{2+} or Sr^{2+} . The samples were analyzed using PXRD and scanning electron microscopy (SEM). Initial SEM studies using energy-dispersive X-ray spectroscopy (EDS) results indicate that Sr^{2+} is removed from solution by exchanging with Ca^{2+} in CaWO_4 .

Relation of SIRT1/2 to 17 Beta- HSD

Kunaal Patel

Research Advisors: Drs. Greg Butcher and Kevin Pruitt

Department of Biology, Centenary College of Louisiana
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A majority of breast cancers are estrogen dependent. Estrone (E1) and Estradiol (E2) are generally present in normal breast tissue. In highly proliferating breast cancer cell lines, the ratio of E2 to E1 has been found to be nine times higher. 17 Beta-hydroxysteroid dehydrogenase (17B-HSD) is an enzyme that is used in the conversion of estrones (E1) into estradiols (E2), and hence determines the ratio of E2 to E1. Members of the Sirtuin family, SIRT1 and SIRT2 are deacetylases that are involved in many regulatory mechanisms. It has been previously shown that SIRT1 and 2 are able to regulate the activity of aromatase in breast cancer tissue, in the estrogen production pathway. Because evidence suggests that SIRT1 may act beyond controlling aromatase, we reasoned that it may also regulate the 17B-HSD. We aim to determine if SIRT 1 and 2, regulates the mRNA and protein levels of 17B-HSD. We hypothesize that pharmacologically inhibiting SIRT1/2 will result in a reduction of both protein levels and mRNA levels of 17B-HSD. We will use the Western blotting procedure to measure changes in protein levels and qPCR to measure changes mRNA levels in breast cancer cells treated with inhibitors of SIRT1/2 relative to a vehicle control.

Nitric Oxide Production in *Manjano anemonia*

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The objective of this experiment was to determine if the sea anemone *Manjano anemonia* responds to lipopolysaccharide (LPS) by producing nitric oxide (NO), a molecule of biological significance to the respiratory burst of innate immune cells. *M. anemonia* were stimulated with four different concentrations of LPS (0.001, 0.01, 0.1, and 1 µg LPS/mg of tissue) and distilled water as a control, for 0, 2, 4, and 6 hours. Nitric oxide concentrations were measured with a Griess assay. The results of the Griess assay showed that there was a significant increase in the amount of NO production as time progressed for the concentrations of 1 µg/mg LPS and 0.1 µg/mg LPS ($p < 0.01$). Additionally, there was a significant increase in the NO produced by the anemones stimulated with concentrations of LPS of 0.001, 0.1 and 1 µg/mg at hours 4 and 6. These results suggest that NO production by the anemones increased in a time and dose-dependent manner. Furthermore, *M. anemonia* could potentially be used as a simple model for understanding how the respiratory burst of innate immune cells works.

Effects of eicosapentaenoic acid on prostaglandin production associated with *Crotalus atrox* envenomation

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Crotalus atrox venom has been hypothesized to stimulate prostaglandin production, causing local inflammation. This is thought to be due to phospholipase A2 (PLA2), a component of the venom of many snakes in the family Viperidae. PLA2 catalyzes the cellular cascade responsible for prostaglandin production by converting omega-6 fatty acids from the phospholipid membrane into type-2 prostaglandins (PGE2). Oversaturation of the phospholipid membrane with omega-3 fatty acids mediates PGE2 production by competitive production of type-3 prostaglandins, inducing a less severe inflammatory response. This study's objectives were to demonstrate *C. atrox* venom causes increased production of PGE2 and to investigate possible effects omega-3 fatty acid supplementation would have on the inflammatory response in cells treated with *C. atrox* venom. When treated with *C. atrox* venom, bovine cells displayed a significant increase in production of PGE2 compared to control groups. Tissue treated with eicosapentaenoic acid (EPA), an omega-3 fatty acid, did not show a significant change in prostaglandin production, suggesting that EPA does not mediate the inflammatory response caused by *C. atrox* venom in *Bos primigenius taurus*, but further experiments are needed to test if increased cellular EPA incorporation will produce a reduced PGE2 production.

Florigen Makes the Whorl Go Round: A Survey of the FT-like PEBP family in *Sorghum bicolor*

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The transition from vegetative growth to the production of floral structures is a complex process that requires coordination between multiple external pathways, including inputs from day length, temperature, hormones, nutrient signaling, and internal cues from the autonomous pathway and circadian clock. Ultimately, each of these inputs is funneled through certain floral integrators, which convert the many diverse signals into a reproductive switch in the meristem. Among these integrators, a family of phosphatidylethanolamine binding proteins (PEBP), including FLOWERING LOCUS T (FT) and FT-like proteins, play an important role in mediating the transition to flowering. In *Arabidopsis*, the PEBP family is represented by six members, with FT itself

playing the primary role in the floral transition. In certain species, including maize and sorghum, this family has been expanded to more than 20 members, further adding to the complexity that surrounds this phenomenon. As such, it becomes important to the overall understanding of flowering that the function of each PEBP protein participating in the floral initiation process is elucidated. Intensive studies have been performed to achieve this goal in maize, however in sorghum, a crop drawing increasing interest as a bioenergy feedstock, these genes have not been thoroughly studied. If one of these proteins is behaving as a canonical florigen in sorghum, it is hypothesized that it will retain certain characteristics including: 1) expression at the appropriate developmental stage; 2) expression in the proper tissues; and 3) expression in response to photoperiod. To understand the contribution of specific PEBP proteins to floral initiation in sorghum, the temporospatial expression patterns of members of the sorghum PEBP gene family under different conditions was analyzed using qRT-PCR. Additionally, the phylogeny between the PEBP gene family in sorghum and related species was examined.

Social Science Oral Presentations

Relative Impact of Economic, Amenity, and Fiscal Influences on interstate Net Migration in the United States Population in 1990 and 2000

Crystal Hong

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Thoughts of life after college outside of those classroom halls and dorms can be relentlessly daunting; decisions about home and career become actions and not just plans. One of the most important initial steps into the next phase of life involves where to reside and begin the job hunt. Of course individuals are all somehow unique by character or circumstance as to how they approach these decisions; however, there are strong overarching or universal qualities of an area that appeal to practically all individuals and they may also be varying in degree of importance.

There are many implications that arise from age distribution of cities and towns that can affect policy making on the national, regional, and local level. My study will examine variables that encourage or discourage state-to-state net migration within the United States in the years 1990 and 2000. The ambition behind the findings are to encourage and indicate to those involved in state development the varying attracting factors that will incite migration to the state as well as to better accommodate the state's population. This will hopefully contribute to the body of literature and benefit city planners and developers, the government and private sector.

Determinants of Field Goal Success Rates: A Study of Placekicking in the 2012 National Football League Regular Season

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The National Football League (NFL) has established itself as a staple in American culture. Since the NFL's inception in 1920, placekicking has played a prominent role in game play. Due to its effect on game results, researchers have begun to look further into placekicking and its role in American football. Modern placekickers have become extremely accurate with league wide average field goal success rate reaching over 90% for all field goals attempted for the past three seasons. The model used in this research looks into what affects placekicking in the NFL. Variables included vary from things seen in previous research such as field goal distance and experience of kickers, but also new variables such as weather condition, score of the game, and stadium variances. Conclusions found include percentage effects on expected success rates based on changes in variables included.

Examining Heteronormative Gender Enactment Among Gay Men

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This research study explores how hegemonic masculine ideals are embodied and enacted in the lives of homosexual men through sexual practices and desires. Through 12 interviews designed to probe how gay men view gender and how gendered notions impact their sexual desires and behaviors, I examine whether and how gay men internalize hegemonic masculine ideals and how such engendering impacts sexuality. Enacting masculinity, as described by R.W. Connell, is a dynamic process describing the intersection of self, interactional processes and practices, and social institutions. Connell describes hegemonic masculinity as the culturally exalted form of masculinity that is placed in direct opposition and dominance to femininity. Displaying hegemonic masculinity requires demonstrated competence in a set of heteronormatively and culturally idealized actions and behaviors comprised of asserting dominance, toughness, and heterosexuality. How then do homosexual men align their own masculinity in a hegemonically structured society when already predisposed to be in a subordinated position? I will analyze this intersection to explore how marginalized groups adapt and often conform to dominant culture even when they exist in non-normative spaces. This study will enhance insight into subordinate adaptation in the pre-existing realm of research concerning hegemonic masculinity in the homosexual sphere.

Self-Efficacy's Mitigating Role on the Consequences of Negative Feedback

Matthew Scott

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Self-efficacy, the amount of control one feels over one's environment or performance, has been shown to be one of the most powerful predictors of performance across several fields. For example, self-efficacy was shown to be a stronger predictor of musical ability than the overall time a performer has spent playing his or her instrument (Ritchie & Williamon, 2012). However investigating the direct relationship between self-efficacy and performance is not enough. Receiving negative feedback is an inevitable occurrence in all fields of study and performance. Negative feedback can hurt a person's performance, but it is not clear how self-efficacy might mitigate a person's reaction to negative feedback. This study investigates this relationship by giving participants false negative feedback on a grammar task and monitoring how self-efficacy moderates the effects on future performance on the same type of task. Previous research suggests that participants with higher levels of self-efficacy will be more resilient in response to negative feedback than those with lower levels of self-efficacy.

The Effects of Peer and Faculty Mentorship on Student Retention: A Pilot Study on how Mentoring Influences First Year Centenary College Students

Freddricka Richardson

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Retention rates reflect in their calculation whether or not students graduate from their college or university, transfer to another institution, or drop out of college altogether. These numbers are very important to colleges and universities. The goal of this study is to examine the effects of peer and faculty mentoring on the retention rates of first year students. Students who served as orientation mentors were asked to fill out an application and apply to be student mentors. Peer mentors were chosen based on GPA, credentials, and experience. The faculty members that served as first-year advisors were emailed and asked to participate in the program as faculty mentors. Those who accepted the task were chosen as faculty mentors. The subjects were studied over a period of several months to see whether or not mentoring would have a positive effect on academic performance, university satisfaction, student involvement, academic achievement, self-awareness, and knowledge about academic opportunities; and eventually lead to an increase in retention rates.

Due to the experimental design and small sample size, one could not come to a conclusion as to whether or not mentoring effects retention rates, but results showed that mentoring is effective, just only under certain conditions.

Humanities Oral Presentations

African American Confederates of the Lost Cause

Kayla Marion

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Scholars have analyzed and expanded on Charles Reagan Wilson's argument of a civil religion that formed in the South. Feeling like their identity and culture had been taken away after the defeat of the Civil War; many southerners reflected a nostalgic past of chivalry and morality that had been lost but not forgotten. My research focuses on one aspect of the religion of the Lost Cause: African American involvement in Civil War reenactments. An African American Confederate activist, HK Edgerton, engages in pilgrimages across the South while dressed in a Confederate uniform. Edgerton and African Americans Confederates engage in these spectacles to illustrate their perspective of what the south means to their identity and heritage which is often different from the typical portrayals associated with the south and racism. Why do African Americans want to reenact as a slave? Why do African Americans feel a strong connection to the Confederacy as opposed to the racist connotations tied to the Confederate flag? Investigating such questions as well as their motivations, demonstrates their understanding of the religion of the Lost Cause.

Feminism, Orientalism and Polemics: Two American Muslim Feminists and their Jihads

Tianna Murphy

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This essay analyzes two American Muslim feminists, Asma Gull Hasan and Asra Nomani, and their views on veiling and mixed-gender prayers, respectively. I will study their contributions to these issues in light of events surrounding Islamic feminism in the United States, especially with the increased attention the Muslim community has received since 9/11, and parse out how radical their polemics actually are in terms of other parts of the Islamic community. I will also critique the inclusiveness of their ideas of feminism, studying their responses to other Muslims's ideas of the need for feminism in Islam and their critiques of those who live feminism differently from themselves. Further, I will examine them in the scope of orientalism as both women fight against Western stereotypes of Muslim women (being submissive, veiled, shoved behind the scenes) and the conservative Islamic power structures that seek to enforce those same stereotypes.

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